3.8 AIR QUALITY

3.8.1 Affected Environment

The affected environment for air quality includes the existing meteorology, climate, and pollution levels in the region of the proposed including its major elements. Air quality issues include emissions associated with construction of the pipeline and operational emissions associated with the pump stations and the Kittitas Terminal compared to relevant standards and regulations. These are discussed below.

3.8.1.1 Air Quality Standards

National Ambient Air Quality Standards (NAAQS) have been established by the U.S. Environmental Protection Agency (EPA) for a number of Acriteria pollutants@ including lead, ozone, carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), total suspended particulates (TSP), and particulates with aerodynamic diameters of less than 10 microns (PM10) (Table 3.8-1).

Several of these pollutants are subject to Aprimary@ and Asecondary@ standards. Primary standards are designed to protect human health with a margin of safety. Secondary standards are established to protect the public welfare from any known or anticipated adverse effects associated with these pollutants such as soiling, corrosion, or damage to vegetation.

3.8.1.2 Prevention of Significant Deterioration

Prevention of Significant Deterioration (PSD) regulations were established by EPA to ensure that new or expanded sources of air pollution do not cause a deterioration in air quality in areas which currently meet ambient standards. The threshold for determining whether a facility is a major source and subject to PSD regulations is:

- a facility that falls within one of 28 listed categories and that emits more than 91 metric tons (100 tons) per year of any criteria pollutant, or

- a facility not listed that emits more than 227 metric tons (250 tons) per year of a criteria pollutant.

The first of these thresholds, a listed category, could apply to the proposal. However, the proposal does not meet or exceed the PSD threshold, as discussed in this section.

Table 3.8-1. National and State of Washington Ambient Air Quality Standards

	National (EPA)		
Pollutant	***Primary***	***Secondary***	***Washington State***
Total Suspended Particulates			
Annual geometric mean	No standard	No standard	60 Fg/m^3
24-hour average	No standard	No standard	150 Fg/m^3
Lead (Pb)			
Quarterly average	1.5 Fg/m^3	1.5 Fg/m^3	1.5 Fg/m^3
Particulate Matter (PM_{10})			
Annual arithmetic mean	50 Fg/m^3	50 Fg/m^3	50 Fg/m^3
24-hour average	150 Fg/m^3	150 Fg/m^3	150 Fg/m^3
Sulfur Dioxide (SO_2)			
Annual average	0.03 ppm	No standard	0.02 ppm
24-hour average	0.14 ppm	No standard	0.10 ppm
3-hour average	No standard	0.50 ppm	No standard
1-hour average	No standard	No standard	0.40 ppm[a]
Carbon Monoxide (CO)			
8-hour average	9 ppm	9 ppm	9 ppm
1-hour average	35 ppm	35 ppm	35 ppm
Ozone (O_3)			
1-hour average[b]	0.12 ppm	0.12 ppm	0.12 ppm
Nitrogen Dioxide (NO_2)			
Annual average	0.05 ppm	0.05 ppm	0.05 ppm

Note: Annual standards never to be exceeded. Short-term standards not to be exceeded more than once per year unless noted.

[a] 0.25 ppm not to be exceeded more than two times in 7 consecutive days.

[b] Not to be exceeded on more than 1 day per calendar year as determined under the conditions indicated in Chapter 173-475 WAC.

ppm = parts per million
PM_{10} = particles 10 or less microns in size
Fg/m^3 = micrograms per cubic meter

Source: Washington Department of Ecology 1991.

3.8.1.3 Toxic Air Pollutant Regulations

The Washington Department of Ecology regulates emissions of known carcinogenic and toxic air pollutants from new and modified air pollution sources (WAC 173-460). EFSEC regulates those of qualifying energy facilities. The regulation establishes acceptable source impact levels (ASILs) for more than 500 substances.

For each known, probable, or potential human carcinogenic pollutant (the Class A toxic air pollutants), the ASIL limits the risk of an additional cancer case to one in a million. For others (the Class B toxic air pollutants), the ASIL is set by dividing those Class B toxics which have an inhalation reference factor by 300; this is intended to protect public health in communities with multiple sources of toxic air pollutants. Most of the Class A toxic air pollutant ASILs are based on an annual average concentration. A few of the Class A pollutants and all of the Class B pollutants are based on a 24-hour average concentration.

A facility can demonstrate compliance with WAC 173-460 by meeting established Small Quantity Emission Rates (SQERs) or by dispersion modeling. If a source which emits toxic air pollutants does not meet designated SQERs, a dispersion analysis is performed, comparing modeled ambient concentrations and the ASILs. If modeled concentrations are less than the ASILs, a permit can be granted. If not, the applicant must revise the project or submit a health risk assessment demonstrating that toxic emissions from the source are sufficiently low to protect human health.

3.8.1.4 Meteorology and Climate

This section describes the climatic regions in areas where the pipeline project would be located.

Puget Basin. The general climate of the Puget Basin is mild and moist, resulting from prevailing westerly winds off the Pacific Ocean to the west, and the shielding effect of the Cascade Mountains to the east. Winters are mild and summers are cool because of the steady influx of marine air.

Precipitation averages about 91 cm (36 inches) per year and approximately 127 cm (50 inches) per year at the foothills of the Cascades. Less than 20 percent of the annual rainfall occurs during the summer season (April through September). The average winter snowfall is about 23 cm (9 inches), but the snow seldom remains for more than 2 days.

West Cascades. The West Cascade region is influenced by terrain features and elevations which make generalization for this area difficult. Precipitation is very high on the western slopes and decreases along the eastern slopes. As a result of decreasing temperatures during the winter and combined elevation effects, most of the precipitation is in the form of snowfall. Annual snowfall accumulations may reach 1,524 cm (600 inches) with ground accumulations of 7.6 m (25 feet) or more. Temperatures average approximately 20^{o}C (68^{o}F) and may drop to below freezing at night. Precipitation during the summer averages about 8 percent of the annual total.

East Cascades. The East Cascades exhibit similar elevation trends as the West Cascades. Precipitation is not as heavy along the East Cascades, averaging 81 to 122 cm (32 to 48 inches) annually, with snowfall averaging about 508 cm (200 inches) per year. Mean temperatures for the region average -12^{o}C (10^{o}F) during January, and up to 27^{o}C (80^{o}F) in July.

Columbia Basin Hills. Topography in the Columbia Basin Hills includes a number of small valleys and ridges giving a local relief of as much as 305 m (1,000 feet). The climate of the Columbia Basin Hills is relatively mild and dry. This region has characteristics of both maritime and continental climates, modified by the Cascade and Rocky Mountains, respectively. Summers are dry and hot, and winters cool with only light snowfall. Afternoons are hot, but the dry air results in a rapid temperature fall after sunset, and nights are cool.

Precipitation follows the pattern of a West Coast marine climate with typical late fall and early winter highs. However, since the Columbia Basin Hills lie in the rainshadow of the Cascades, total precipitation is low. Snowfall in the Columbia Basin Hills area is light, averaging about 58 to 64 cm (23 to 25 inches). Winds are mostly light, averaging about 7 miles per hour for the year, being somewhat stronger in late spring and weaker in winter.

Columbia Basin Flats. The moderate climate of the Columbia Basin Flats is due to the prevailing flow of air from over the Pacific Ocean. Summer hot spells are caused by a northward drift of warm dry air. Most summers have about 4 days with temperatures of 38^{o}C (100^{o}F) or higher. Hot spells are broken by flows of cool air from over the ocean.

Annual precipitation in the Columbia Basin Flats usually ranges between 28 and 51 cm (11 to 20 inches). Precipitation is low because the prevailing flow of air from over the ocean loses much of its moisture while crossing the Cascade Mountains. Terrain effects on most elements of local weather are frequently greater than those associated with migratory weather systems. Winds are generally quite light but occasional wind storms and dust storms may be expected.

3.8.1.5 Existing Air Quality

The Kittitas Terminal would be the largest source of pollutants associated with the proposal. The Kittitas Terminal would be located in an unclassified area for all established criteria pollutants. Pump stations would be minor sources of air pollutants. Portions of the pipeline would be located in King and Snohomish Counties, which have recently been reclassified as attainment areas for ozone, CO, and PM10.

The Washington Department of Ecology maintains a network of monitoring stations throughout the state. Monitoring stations are located mainly in urban areas where pollutant concentrations are expected to be higher, either adjacent to major sources of pollutants or near potential problem areas. There are no monitoring stations for criteria pollutants in the vicinity of the Kittitas Terminal because the area does not experience significant air quality problems.

3.8.2 Environmental Consequences

3.8.2.1 Proposed Petroleum Product Pipeline

Construction Impacts

Pipeline. Emissions associated with pipeline construction would include vehicle exhaust from a number of activities such as preparing the corridor, installing pipe and backfilling the trench, and fugitive dust generated by earthmoving activities and vehicles traveling on unpaved surfaces. Air quality impacts associated with these activities would be localized and temporary, lasting only for the duration of the construction period until exposed soils are stabilized.

Construction equipment exhaust emissions would be well below levels that would cause long-term exceedances of the air quality standards for CO, SO_2, and nitrogen oxides, and would occur for only a short time at any one location. The only construction activities that could generate substantial emissions would be those producing fugitive dust.

OPL conducted dispersion modeling using the ISCST3 model to determine the maximum concentrations of fugitive dust (TSP and PM10) that could be generated by construction of the pipeline. Based on modeling results detailed in the ASC (OPL 1998), it is possible that TSP and PM10 levels could exceed the 24-hour standard within approximately 100 m (328 feet) of the pipeline while site preparation and pipelaying activities are in progress. However, the short duration and localized nature of construction activities at any particular location would minimize overall impacts. Measures to control fugitive dust during construction of the pipeline and pump stations will consist of watering the ROW periodically, as necessary; applying gravel to access roads where traffic volumes are high and where the road surface will need improvement; curtailing construction activities when high winds are contributing to excess dust; and limiting onsite construction speeds to 10 miles per hour.

Pump Stations. No specific information is available on emissions associated with construction of the pump stations. However, due to the small sites required for each pump station, ranging from 0.4 ha (1.0 acre) to less than 1.6 ha (4 acres) per site, site disturbance during construction of the pump stations would not generate substantial emissions from either construction vehicles or fugitive dust.

Kittitas Terminal. Fugitive dust emissions associated with construction of the Kittitas Terminal were estimated using emission factor equations for heavy-duty construction activities from EPA's Compilation of Air Pollutant Emission Factors (AP-42). Emission factor equations relate the quantity (weight) of pollutants emitted to a unit of activity of the source. AP-42 equations are used to estimate area-wide emissions, emissions from a specific source, and evaluation of emissions relative to ambient air quality.

Assuming that the entire site (10.9 ha or 27 acres) is disturbed for one full month of construction, approximately 29.5 metric tons (32.4 tons) of PM10 would be generated during the construction period. Uncontrolled emissions could be reduced by water suppression methods, which can yield a 50 percent decrease in fugitive emissions, reducing overall fugitive dust emissions to approximately 14.8 metric tons (16.2 tons). These emissions would be considered negligible for this project. Existing tilling activities at the site may produce similar emissions.

Operational Impacts

Pump Stations. Operation of the Thrasher, North Bend, Stampede, Beverly-Burke, Othello Pump Stations, and the Pasco Delivery Facility would not produce major emissions because all equipment at these stations would be operated electrically. Leaks from equipment (e.g., seals, flanges, and connections) would be a potential source of fugitive volatile organic compound (VOC) emissions.

All of the pump stations would have a similar design, with the exception of the Thrasher Station which would require additional valves, pipeline hardware, and connections because it ties into an existing pipeline. VOC emissions from the pump stations and the Pasco Delivery Facility were estimated using emission factor equations from AP-42. Each of the pump stations would emit approximately 0.49 metric ton (0.54 ton) per year of VOCs, and would be considered a negligible source of VOC emissions (OPL 1998). The pump stations would not require registration with the state because of the negligible emissions.

Kittitas Terminal. The terminal would be the largest source of emissions associated with the proposal. Because of the nature of the operations at the terminal (storage and loading of fuels), total VOCs would be the primary pollutant of concern. Toxic emissions (benzene) were also estimated and compared to Ecology's ASILs. Pumping and metering equipment at the Kittitas Terminal would be operated by electricity; therefore, emissions associated with this equipment would be negligible.

The Kittitas Terminal would include a diesel-operated firewater pump for use during emergency situations. This pump would be periodically tested to ensure proper operation. The firewater pump would be operated one-half hour per week as required by fire safety codes. The pump uses a diesel-operated internal combustion engine rated at 200 horsepower. AP-42 emission factor equations were used to estimate potential emissions from this source. Because the pump would be operational for only 26 hours per year, emissions from this source would be much less than 0.9 metric ton (1 ton) per year for all criteria pollutants, and would be considered negligible. (OPL 1998.)

Thus, the primary sources of operational emissions from the Kittitas Terminal include: (1) bulk storage tanks; (2) dispensing of fuel from storage tanks to tanker trucks (truck loading losses); and (3) fugitive emissions from pipeline valves, flanges, and pump seals throughout the facility. These are discussed in detail below.

Total VOC emissions for the Kittitas Terminal from storage tanks (12.9 metric tons [14.22 tons] per year) and all other sources are estimated at 14.09 metric tons (15.54 tons) per year. This is less than the threshold of 91 metric tons (100 tons) which defines a major source (WAC 173-44-030).

Bulk Storage Tanks. The design of storage tanks at the Kittitas Terminal would be determined from the types of products in demand and the quantity of demand for those products. For this analysis, demand was based on historical records and OPL=s professional experience and judgement about what types of products would likely be stored at the facility.

The fuel types (and percentage of total volume) to be transported and stored at the terminal were assumed to be subgrade gasoline (20.1 percent), regular gasoline (20.1 percent), premium gasoline (19.8 percent), low-sulfur diesel (18 percent), and high-sulfur diesel (22 percent). Each storage tank would operate on a 6-day turnover cycle which would result in a maximum of 60 turnovers per year for each tank. OPL has indicated that they would accept permit restrictions limiting throughput of fuel into the storage facility at 39,639,000 bbls per year (approximately 100,000 bbls per day). (This is equivalent to about 1.6 billion gallons per year, assuming 42 gallons per barrel.)

Storage tanks containing volatile liquids such as petroleum products have product losses during storage due to evaporation of the liquid (standing losses) and losses as a result of changes in liquid levels (working losses). Standing losses in tanks with internal floating roofs occur mainly as a result of an improper fit between the deck seal and the wall of the tank. These seals slide against the tank wall as the deck is raised or lowered. Other penetrations in the deck, such as gauge attachments, access hatches, ladder wells, and column wells, also contribute to standing losses. Standing losses can be minimized through the use of primary and secondary deck seals, and inspection of the storage tank equipment, all of which are required by regulation (40 CFR Part 60, Subpart Kb).

Working losses result from residual liquid on the tank wall or support columns during lowering of the liquid levels. The design of an internal floating roof with an external fixed roof reduces evaporative emissions due to wind loss.

An EPA model, TANKS3, was used to estimate VOC storage tank losses. Input parameters and assumptions used in the program are included in the ASC (OPL 1998). Approximately 12.9 metric tons (14.22 tons) per year of total VOC emissions would result from storage tank losses at the Kittitas Terminal and would be considered a minor impact.

Loading Rack. OPL is seeking to limit daily throughput out of the terminal to central Washington markets at 1,020,000 gallons per day. Annual throughput would be 373,300,000 gallons per year. The remaining product would continue in the pipeline to Pasco.

Two tanker trucks with a carrying capacity of 10,000 gallons can load product simultaneously, taking approximately 20 minutes per loading operation. Therefore, the maximum number of trucks that could load product is six trucks per hour. The loading rack is anticipated to operate 24 hours per day with the majority of the loading occurring during the early morning and daylight hours. This would be equivalent to 102 trucks with 10,000-gallon capacity loading product in a 24-hour period.

The proposed design of the truck rack includes a vapor recovery system with a high-efficiency carbon adsorption system to reduce emissions of VOCs by at least 99.9 percent. This level of emission control more than satisfies the requirement to limit emissions to no more than 10 milligrams per liter (mg/l) of gasoline loaded, which is stipulated by the maximum achievable control technology (MACT) standard for this source category (40 CFR 63 Subpart R). The calculated emission rate for the facility at this level of control is approximately 1 mg/l. Vapor recovery and carbon adsorption with a 99.9 percent level of VOC control is considered to be the Atop@ level of emission control available for this equipment.

Dispensing fuel from the storage tank into tanker trucks at the main loading rack could result in the loss of VOCs at many locations. Tanker truck loading at the Kittitas Terminal would be by bottom-filled, submerged loading with dry coupling attachments at the product-loading arms. With this method of loading, the tanker truck is filled from the bottom of the tanker with the loading arm submerged below the liquid level. Dry-break couplings on the loading arms virtually eliminate product spills and vapor emissions when decoupling the arms from the trucks. The vapor recovery system consists of a vapor recovery unit and processing of displaced vapors from the truck tank. This method of loading is considered the most effective means of reducing VOC losses during loading.

VOC losses due to tank truck loading were estimated using AP-42 emission factor equations provided by the EPA (1995) for this type of operation (emission factor equation and assumptions concerning loading losses are detailed in OPL 1998). The use of a 99.9 percent efficient vapor recovery system would reduce uncontrolled, total VOC losses at the loading rack from a potential 823 metric tons (907 tons) per year to less than 0.91 metric ton (1 ton) per year. This would be a minor impact.

Fugitive VOC Emissions. Fugitive emissions of VOCs could result from leaking valves, flanges, compressor seals, and other components throughout the terminal. The most feasible control option is an inspection and maintenance program to identify and repair leaking components on a routine basis. To meet the benzene ASIL, zero-emissions valves and pump seals would be used as part of the vapor recovery system. Zero-emissions equipment is the most effective means for controlling fugitive emission VOCs and benzene emissions.

Fugitive emissions resulting from leaks in the pipeline valves, flanges, and pump seals were estimated using AP-42 emission factor equations and guidance provided by EPA (1996). Total VOC emissions due to leaks are estimated at 0.37 metric ton (0.41 ton) per year (uncontrolled). With proper monitoring of the facility and reporting of leaks as required by 40 CFR Part 63, OPL estimates that controlled fugitive emissions could be reduced to approximately 0.22 metric ton (0.24 ton) per year. (OPL 1998.)

Fugitive Dust. Annual PM_{10} emissions from the site are likely to be reduced because of elimination of current farming practices and conversion of exposed soil to impervious surface.

Toxic Pollutants. Emissions of toxic pollutants must comply with requirements established by Ecology in WAC 173-460. Compliance with ASILs for a toxic pollutant can be demonstrated by either (1) meeting Small Quantity Emission Rates (SQERs) for each toxic pollutant emitted, or (2) using air dispersion modeling to demonstrate that concentrations of toxic air pollutants do not exceed the ASIL for that pollutant.

OPL estimates that benzene emissions from the Kittitas Terminal operations would equal approximately 164 kilograms (362 pounds) per year, exceeding the SQER of 9 kilograms (20 pounds) per year. Therefore, dispersion modeling was performed to demonstrate compliance with the benzene ASIL (0.12 micrograms per cubic meter).

Toxic pollutant modeling for benzene concentrations at and beyond the property boundary was performed using ISCLT3, an EPA-approved, long-term dispersion model. All pollutant-emitting sources at the facility were considered in the modeling, including storage tanks emitting benzene, fugitive benzene emissions, and benzene emissions from the vapor recovery system. Results from the modeling indicate that the maximum benzene concentration of 0.1 microgram per cubic meter occurs along the west border of the property. This would meet the designated benzene ASIL of 0.12 microgram per cubic meter.

Odor. The primary source of odor at the Kittitas Terminal would be petroleum. Emission control technologies employed on the tanks and loading operations would minimize fugitive emissions of VOCs and the release of odors into the surrounding area.

To evaluate potential odor impacts, the ISCST3 computer model was run with emissions from all sources at the Kittitas gasoline distribution facility and the full set of meteorological inputs from the SCREEN3 model used to estimate the maximum 1-hour VOC concentration that would occur due to operations of the proposed facility (refer to the ASC for details concerning the modeling parameters). The highest 1-hour VOC concentration was estimated at 126.43 micrograms per cubic meter at a receptor near the western fence line of the facility. The maximum 1-hour VOC concentration was used as the basis for an evaluation of the maximum potential for offsite odor impacts as discussed below.

First, the predicted VOC concentration was multiplied by an assumed peak-to-mean ratio of 2.0 to account for the fact that odor detection occurs on a time scale smaller than 1 hour. This factor corresponds roughly to the use of the power law relationship in Turner (1969) for scaling from a 1-hour average concentration to a maximum 1-minute concentration, which is a more suitable basis for evaluating odor effects.

Next, the assumed maximum 1-minute concentration of VOC was apportioned according to the mass fractions of constituent compounds in gasoline vapors, since these vapors would be the dominant source of VOC emissions at the proposed facility. The gasoline compound with the highest odor potential is toluene. The published odor threshold for toluene is 2.9 parts per million (Amoore and Hautala 1983). The fraction of toluene in the maximum predicted 1-minute concentration at the fence line is estimated at 0.0004 parts per million, which is several orders of magnitude below the odor detection threshold for this compound. Based on this result, the concentrations of other compounds with lesser odor potentials would be far below their respective detection limits. (OPL 1998.)

Clarkston and Umatilla Oil Terminals. The product terminals at Umatilla and Clarkston are likely to close with the project because Tidewater Barge Lines, Inc., would no longer haul product up the Columbia River. If closed, VOC emissions from these tank farm terminals would be eliminated.

Columbia River Approach and Crossing Options. There are no differences in air quality impacts from either the Ginkgo State Park/YTC segment options or the Columbia River crossing options.

Cumulative Impacts. No significant air emissions are expected from the project and no other significant hydrocarbon source in the area is known. The proposed project would contribute minor air emissions in the region. No cumulative emissions impacts would occur.

3.8.2.2 No Action

Under the No Action Alternative, the proposed pipeline would not be constructed; current modes of product transport would continue and would increase in volume over the years. Additional truck traffic would be required to distribute product to eastern Washington markets.

According to OPL, truck traffic on major roadways would increase from 50 to 60 tanker trucks per day under existing conditions, to 128 trucks per day in 2026. Given the existing traffic volumes on I-5 and I-90 (10,000 to 30,000 vehicles per day depending on location), this increase in truck volumes would have a negligible impact on air quality.

Barge traffic would continue to increase on the Columbia River and operation of the oil product terminals at Portland would continue with or without the project. Compared to traffic volumes on I-84 adjacent to the Columbia River (average daily traffic volumes of approximately 27,000 vehicles per day), barge emissions on the Columbia River are negligible. Assuming three petroleum-related barge trips through the Columbia River Gorge (approximately 120 km [75 miles]) per week, monthly emissions would be less than 2 metric tons each of CO, hydrocarbons (HC), and NO_x. Traffic emissions on I-84 through the same 75-mile stretch would be approximately 910 metric tons (1,000 tons) of CO, 97 metric tons (107 tons) of HC, and 237 metric tons (260 tons) of NO_x. Therefore, increasing or decreasing barge traffic on the Columbia River would have a negligible impact on overall air quality.

In addition, VOC emissions would continue as a result of barging operations on the Columbia River including emissions from the Clarkston and Umatilla terminals. According to OPL, more than 410 metric tons (450 tons) per year of VOCs are emitted each year as a result of barge loading on the Columbia River. This would likely increase as a result of more barge operations in the future.

The Kittitas Terminal site would continue as farmland with associated harvest, planting, and soil exposure releasing fugitive dust.

3.8.3 Additional Proposed Mitigation Measures

3.8.3.1 Construction Mitigation and Subsequent Impacts

There are no mitigation measures proposed for construction of the pipeline beyond those proposed by OPL in the ASC.

3.8.3.2 Operational Mitigation and Subsequent Impacts

There are no mitigation measures proposed for the Kittitas Terminal or for the pipeline and pump stations beyond those required by regulation.

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